

C. Claims

Please cancel claims 2, 8 and 12 without prejudice or disclaimer and amend claims 1, 3-7, 9-11, 13 and 14 as follows. A complete listing of all the claims appears below; this listing replaces all earlier amendments and listings of the claims.

1. (Currently Amended) An ink jet printing apparatus capable of mounting a printing head having a plurality of ink discharging ports for discharging ink, electrothermal energy converting ~~elements~~ elements provided corresponding to each of said plurality of ink discharging ports, said electrothermal energy converting elements capable of being energized; energized by an energization means and then generating a bubble in the ink to discharging discharge ink; said energization ~~means~~; means comprising:

a single driving power source serving as a source of supplying ~~said an~~ an electrical energy; and

a control unit for controlling the electrical energy supplied from said driving power source;

wherein said control unit performs a control for supplying said electrothermal energy converting ~~element~~ elements with ~~such an~~ said electrical energy that generates a said bubble to the extent that ink droplets are discharged from the ink discharge ports, if the electrothermal energy converting ~~element is~~ elements are driven to accomplish printing;

wherein said control unit performs a control for supplying said electrothermal energy converting ~~element~~ elements with ~~such an~~ said electrical energy that

generates a said bubble to the extent that ink droplets are not discharged from the ink discharge ports; and

wherein said controls are selectively performed; and

wherein said control unit has voltage generating means for generating at least two types of voltage such as a high voltage and a low voltage, the voltage generating means applying a relatively low voltage to said electrothermal energy converting elements when generating said bubble to the extent that ink droplets are not discharged from the ink discharging ports.

2. (Cancelled)

3. (Currently Amended) The ink jet printing apparatus according to claim 2 1, wherein said voltage generating means is provided with a voltage drop generating means for generating at least one type of voltage lower than the voltage supplied by the driving power source and either the voltage supplied by said driving power source or the voltage obtained through said voltage drop generating means is selectively supplied to driving means for supplying or shutting down voltage supply for said electrothermal energy converting ~~element~~ elements.

4. (Currently Amended) The ink jet printing apparatus according to either one of claims 1 and 3, wherein said control unit is provided with an energization time control means for selecting either a long period of time or a short period of time, during which the voltage generated by said voltage generating means is applied, and said

energization time control means sets ~~en~~ an energization time valid when a lower voltage of the high and low voltages generated by said voltage generating means is selected longer than the energization time valid when the higher voltage is selected.

5. (Currently Amended) The ink jet printing apparatus according to claim 4, wherein the energization time set when the low voltage is provided by said voltage generating means is established through selection from among bubble forming times available in a type having the lowest applied voltage out of two types approximated with two substantially straight lines and a type resident in a boundary area of these two types when an applied voltage-to-bubble forming starting time characteristics of said electrothermal energy converting ~~element~~ elements are plotted on a double logarithmic chart.

6. (Currently Amended) An ink jet printing method using a printing head having a plurality of ink discharging ports for discharging ink, electrothermal energy converting elements provided corresponding to each of said plurality of ink discharging ports, said electrothermal energy converting elements being capable of being energized, energized by an energization means and then generating a bubble in the ink to discharge ink; comprising the steps of:

~~first step for~~ supplying said electrothermal energy converting ~~element~~ elements with ~~such~~ an electrical energy that generates a said bubble to the extent that ink droplets are discharged from the ~~nozzle~~ ink discharge ports, if the electrothermal energy converting ~~element~~ is elements are driven to accomplish recording printing; and

~~second step~~ for supplying said electrothermal energy converting ~~element~~
elements with ~~such~~ an electrical energy that generates bubbles to the extent that ink
droplets are not discharged from the ~~nozzle~~ ink discharge ports;

wherein ~~said first step and second step~~ the steps are selectively performed;
and

wherein said steps are accomplished using a voltage generating means for
generating at least two types of voltage such as a high voltage and a low voltage, the
voltage generating means applying a relatively low voltage to said electrothermal energy
converting elements when generating said bubble to the extent that ink droplets are not
discharged from the ink discharging ports.

7. (Currently Amended) An ink jet printing apparatus capable of mounting a
printing head having a plurality of ink discharging ports for discharging ink, electrothermal
energy converting ~~elements~~ elements provided corresponding to each of said plurality of ink
discharging ports, said electrothermal energy converting elements capable of being
energized; energized by an energization means and then generating a bubble in the ink to
discharge ink;

wherein said energization means generates driving signals for supplying
said electrothermal energy converting elements corresponding to low use frequency ink
discharging ports with such an electrical energy that generates bubbles in ink in said low
use frequency ink discharging ports to the extent that ink droplets are not discharged from
said low use frequency ink discharging ports; and

wherein said energization means is provided with a voltage generating means for generating at least a high voltage and a low voltage and voltage selecting means capable of applying selectively either of the two different voltages generated by said voltage generating means to said electrothermal energy converting elements.

8. (Cancelled)

9.(Currently Amended) The ink jet printing apparatus according to claim 8 7, wherein said energization means is provided with an energization time control means for selecting either a long period of time or a short period of time, during which the voltage generated by said voltage generating means is applied, and said energization time control means sets ~~on~~ an energization time valid when a lower voltage of the high and low voltages generated by said voltage generating means is selected longer than the energization time valid when the higher voltage is selected.

10.(Currently Amended) The ink jet printing apparatus according to claim 9, wherein the energization time, set when the lower voltage of the high and low voltages generated by said voltage generating means is selected, is established through selection from among bubble forming times available in a type having the lowest applied voltage out of two types approximated with two substantially straight lines and a type resident in a boundary area of these two types when an applied voltage-to-bubble forming starting time characteristics of said electrothermal energy converting ~~element~~ elements are plotted on a double logarithmic chart.

11. (Currently Amended) An ink jet printing method, ~~comprising using a~~ printing head ~~forming~~ having a plurality of ink discharging ports for discharging ink, ~~each~~ of said plurality of ink discharging ports being provided with an electrothermal energy converting ~~element~~, elements provided corresponding to each of said plurality of ink discharging ports, said electrothermal energy converting ~~element~~ elements capable of being energized by an energization means and then generating a bubble in the ink to discharge ink; said method comprising the step of:

~~wherein said energization means generates~~ generating driving signals with said energization means for supplying said electrothermal energy converting elements corresponding to low use frequency ink discharging ports with such an electrical energy that generates bubbles in ink in said low use frequency ink ~~discharging~~ discharging ports to the extent that ink droplets are not discharged from said low use frequency ink discharging ports; and

energizing said electrothermal energy converting elements with at least either a high voltage or a low voltage applied selectively thereto.

12. (Cancelled)

13. (Currently Amended) The ink jet printing method according to claim ~~12~~ 11, wherein an energization time set when, of the high and the low voltages applied to said electrothermal energy converting ~~element~~ elements, the low voltage is selected is longer than an energization time set when the high voltage is selected.

14. (Currently Amended) The ink jet printing method according to claim 13, wherein the energization time, set when the lower voltage of the high and low voltages generated by said voltage generating means is selected, is established through selection from among bubble forming starting times available in a type having the lowest applied voltage out of two types approximated with two substantially straight lines and a type resident in a boundary area of these two types when an applied voltage-to-bubble forming starting time characteristics of said electrothermal energy converting ~~element~~ elements are plotted on a double logarithmic chart.